CLAIMS

Having thus described the preferred embodiment, the invention is now claimed to be:

1. An x-ray tube **(11)** comprising:

a frame **(16)** which encloses an evacuated chamber **(14)**;

an anode **(12)** disposed within the evacuated chamber;

the frame including a vessel **(40, 40′ , 40′ ′ , 40′ ′ ′)** which surrounds the anode, the vessel being defined by a combination of a material with high thermal conductivity and lower deformation resistance and a material with high deformation resistance and lower thermal conductivity.

2. The x-ray tube according to claim 1, wherein the vessel includes:

a liner **(64, 64′ , 64′ ′ , 64′ ′ ′)** formed from a thermally conductive material which at least partially defines the evacuated chamber; and

a framework **(62, 62′ , 62′ ′ , 62′ ′ ′)** which supports the liner and is formed from a structural material, the framework defining at least one thermal window **(80, 80′ , 80′ ′ , 82, 82′ , 124)** therein through which the liner is in thermal contact with both the evacuated chamber and a surrounding cooling fluid.

3. The x-ray tube according to claim 2, wherein the framework and the liner are concentric.

4. The x-ray tube according to claim 2, wherein the framework **(62, 62′ ′ , 62′ ′ ′)** surrounds the liner **(64, 64′ ′ , 64′ ′ ′)**.

5. The x-ray tube according to claim 2, wherein the thermal window comprises at least one slot **(80, 80′ , 80′ ′ , 82, 82′)** defined in the liner **(64, 64′)**.

6. The x-ray tube according to claim 5, wherein the at least one slot includes a plurality of angularly spaced slots **(80, 80′ , 80′ ′ , 82, 82′)**.

7. The x-ray tube according to claim 2, wherein the thermally conductive material has a thermal conductivity which is at least twice that of the structural material.

8. The x-ray tube according to claim 2, wherein the structural material has a yield strength which is at least twice that of the thermally conductive material.

9. The x-ray tube according to claim 2, wherein the structural material includes stainless steel.

10. The x-ray tube according to claim 2, wherein the thermally conductive material includes copper.

11. The x-ray tube according to claim 2, wherein the liner includes a cylindrical side **(67, 67′ , 67′ ′ ′)**, and a base **(68, 68′ , 68′ ′ ′)** and wherein the framework includes a cylindrical side **(75, 75′ , 75′ ′ ′)** and a base **(76, 76′ , 76′ ′ ′)**, the side of the liner being joined to the side of the framework.

12. The x-ray tube according to claim 2, wherein one of the liner and the framework is received within the other of the liner and the framework.

13. The x-ray tube according to claim 2, wherein the liner defines a central aperture **(70, 70′ , 70′ ′ , 70′ ′ ′)** and the framework defines a central aperture **(78, 78′ , 78′ ′ , 78′ ′ ′)**, the anode including a shaft **(17)** which extends through the central apertures.

14. The x-ray tube according to claim 2, wherein the liner and the framework define a fluid flowpath **(120)** there between for the cooling fluid to contact the liner.

15. The x-ray tube according to claim 2, further including a plate **(44)** which closes an end **(42)** of the vessel **(40, 40′ , 40′ ′ , 40′ ′ ′)**, the plate defining an aperture **(46)** through which a cathode assembly extends for emitting electrons that pass between a cathode and the anode.

16. The x-ray tube according to claim 2, wherein the vessel comprises a laminate of the conductive and structural materials.

17. An x-ray tube assembly **(10)** comprising:
the x-ray tube**(11) of claim 1**; and
a housing **(30)** surrounding at least a portion of the x-ray tube, the housing containing the cooling fluid.

18. A method of transferring heat from an x-ray tube **(11)** to a surrounding cooling fluid comprising;
conducting heat from an evacuated chamber **(14)** through a liner **(64, 64′ , 64˜, 64′ ′ ′)** of the x-ray tube formed from a thermally conductive material;
restraining the liner against deformation with a structural framework **(62, 62′ , 62′ ′ , 62′ ′ ′)**.

19. The method according to claim 18, wherein the structural framework defines at least one thermal window **(80, 80′ , 80′ ′ , 82, 82′ , 124)**, the heat flowing directly between the liner and the surrounding cooling fluid in the thermal window.

20. An x-ray tube **(11)** comprising:

a thermally conductive liner **(64, 64′ , 64˜, 64′ ′ ′)** which spaces an evacuated chamber **(14)** of the x-ray tube from a surrounding cooling fluid;

a structural framework **(62, 62′ , 62′ ′ , 62′ ′ ′)** forming a cage which reinforces the liner against deformation.

21. The x-ray tube of claim 18 further including an anode **(12)** mounted in the evacuated chamber.